Magnesium sulfate

Name	Magnesium sulfate
Class	Concentrated electrolyte
Chemistry	Divalent cation salt
Routes of administration	IV, orally, or as a neb
Absorption	30% oral bioavailability (depends on body magnesium levels - more is absorbed in states of systemic magnesium depletion)
Solubility	pKa -3.0; good water solubility
Distribution	`
Metabolism	Not metabolised, but is a cofactor in numerous metabolic processes
Elimination	Renally excreted; reabsorption mainly by thick ascending lmb and distal convoluted tubule. Supraphysiological plasma concentrations result in decreased reabsorption
Time course of action	Half life of around 4 hours
Target receptor	Numerous pharmacodynamic targets, including NMDA receptors, L-type calcium channels,
Mechanism of action	Multiple mechanisms of action, including: - Smooth muscle relaxation by increasing the uptake of intrracellular calcium into the sarcoplasmic reticulum - skeletal muscle relaxation due to inhibition of acetylcholine release from the neuromuscular junction - CNS depressant effects by inhibition of NMDA receptors - Decreased AV node conduction due to calcium channel blocker effects - co-factor in electrolyte homeostasis, including Na+/K+ ATPase function
Clinical effects	Bronchodilation, areflexia, muscle weakness, smooth muscle relaxation, vasodilation, anticonvulsant effects,
Literature reference	Connolly & Worthley (1999)
CICM details of understanding	Level 1

Mentioned around Deranged Physiology	Borderline neglected at this website; Classification of antiarrhythmic agents vaguely mentions it under "other and misc". Minimally attended in the magnesium sulfate entry from the Body Fluids and Electrolytes section. Of greatest use is the chapter on the response to 20mmol of magnesium sulfate, as there is at least some kind of structure there.
Related SAQs	Question 18 from the first paper of 2021 Question 10 from the second paper of 2015 Question 10 from the second paper of 2011 Question 4 from the second paper of 2019